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DATA VALIDATION REPORT FOR THE NAVAL SUBMARINE BASE SITE IN GROTON, CT AREA A WETLAND SOILS COC NOS: N008, N011

Prepared for:

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July 13, 1993

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DATA VALIDATION REPORT

RE: COC Nº: N008, N011
Site: Naval Submarine Base, Groton, CT
Reference: NVDV930503A

Volatiles: 10/soil/2DMW11S(2-4), 3MW12S(0-3), 2WTB8(1-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12), 2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6).

Semivolatiles: 10/soil/2DMW11S(2-4), 3MW12S(0-3), 2WTB8(1-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12), 2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6).

Pesticides: 10/soil/2DMW11S(2-4), 3MW12S(0-3), 2WTB8(1-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12), 2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6).

Metals/CN: 10/soil/2DMW11S(2-4), 3MW12S(0-3), 2WTB8(1-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12), 2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6).

INTRODUCTION

META Environmental, Inc. (META) has completed a validation of the volatile, semivolatile, and pesticide organic and inorganic analytical data from COC Nos. N008 and N011 low level soil samples collected from the Naval Submarine Base site in Groton, CT. The data were evaluated according to guidelines adapted by META, and based on the U.S. EPA Region I Functional Guidelines for Evaluating Organic Analyses (2/88), the U.S. EPA Region I Functional Guidelines for Evaluating Inorganic Analyses (6/88), and the NEESA Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program (20.2-047B).

Triclustered Sample Data Sheets detailing the Contract Required Quantitation Limits (CRQLs), laboratory reported results, instrument detection limits, data validation results, and recommendations for each fraction of every sample have been submitted for your convenience.

The data submitted for COC Nos. N008 and N011 were found to be generally fair. There was much qualification of the VOA data due to blank contamination, calibration, tuning, surrogate recoveries, and internal standard performance. There was some qualification of ABN and PEST data due to calibration. There was some qualification of inorganic data due to blank contamination, spike recovery, duplicate precision, and instrument calibration. The reader should refer to the report for a more detailed discussion of the results.

ORGANIC DATA

Evaluation of the volatile (VOA), semivolatile (ABN), and pesticide (PEST) organic data was based on the following parameters:

- Data completeness
- Holding times
- ☺ GC/MS Tuning
- Calibration
- Blanks
- Method blank/spikes
- Surrogate recoveries
- Matrix spike/matrix spike duplicate
- Field duplicate precision
- ☺ Internal standard performance
- QC check standard performance
- Pesticide instrument performance
- ☺ Compound identification
- ☺ Compound quantitation

☺ - All criteria were met for this parameter.

Data Completeness

The data package contained all of the forms required by the SOW. However, several items that are not required, but are necessary for complete validation were not submitted:

- Extraction logbook pages were not submitted for the ABN or PEST fraction analyses. As a result, it was not possible to validate the extraction date when evaluating sample holding times.

In addition to the forms required by the SOW, the following items are necessary for a NEESA compliant data package:

- The analysis of method/blank spikes, and submission of raw data, summary forms, and control charts for those analyses.

Control charts were submitted with the data package, but raw data and summary forms were not submitted.

In addition, the following items should be noted:

- The copies of the Forms IC and IF for the ABN fraction sample 2SWTB8(1-3) were of poor quality. The validator was able to obtain all the necessary information from the raw data, so no action is necessary.

Holding Times

All of the VOA fraction samples were analyzed within the required holding times. No action is recommended.

All of the ABN fraction samples were extracted and analyzed within the required holding times. No action is recommended.

The PEST fraction samples 2DMW11S(2-4) and 3MW12S(0-3) were extracted seven days outside of the required ten day holding time. It is recommended to estimate (J^{1}, UJ^{1}) all positive and non-detected results for those samples. Extraction dates reported on the Forms I were used to evaluate holding times in the absence of the extraction logbook pages.

GC/MS Tuning

All of the BFB and DFTPP tuning criteria were within the required limits.

It should be noted that the VOA fraction samples 2WTB9(4-6), 2WTB9(4-6)MS, and 2WTB9(4-6)MSD were analyzed 44 hours outside of the required 12 hours from the last tune. It is recommended to estimate (J^{24}) positive results and reject (R^{9}) non-detected results in those samples.

It should also be noted that the VOA fraction sample 2WTB3(10-12) was analyzed outside the required 12 hours from the last tune. This sample was not even present on the Form V (which lists the samples analyzed after the tune), and had to be added by the validator. It is recommended to estimate (J^{24}, UJ^{24}) positive and non-detected results in that sample.

Calibration

The following problems were noted with the initial and/or continuing calibration of the VOA and ABN GC/MS systems:

VOA instrument HP5995D (initial calibration date 8/30/90):

Compound	CC 09/05/90	CC 09/10/90	CC 09/11/90
Chloromethane			X
Bromomethane	X	XX	XX
Vinyl chloride		X	X
Chloroethane		X	X
Acetone		X	
2-Butanone		X	X
Vinyl acetate		X	
4-Methyl-2-pentanone		X	X
2-Hexanone		X	X
Tetrachloroethene		X	
Associated Samples:	2DMW11S(2-4), 3MW12S(0-3).	2WTB3(15-17), 2WTB8(1-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12).	2WTB3(15-17)RE, 2WTB8(6-8)RE, 2WTB8(10-12)RE, 2WTB3(4-6)RE, 2WTB3(10-12)RE.

ABN instrument HP5970J (initial calibration date 09/29/90):

Compound	IC 09/29/90	CC 10/04/90
2,4-Dinitrophenol	X	X
3,3'-Dichlorobenzidine		X
Associated Samples:	2WTB8(6-8), 2WTB8(10-12), 2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6), 2WTB9(4-6)MS, 2WTB9(4-6)MSD.	

ABN instrument HP5970J (initial calibration date 07/05/90):

Compound	IC 07/05/90	CC 09/22/90
Benzoic acid	X	XX
Hexachlorocyclopentadiene		X
2,4-Dinitrophenol	X	X
4-Nitrophenol		
4,6-Dinitro-2-methylphenol		X
3,3'-Dichlorobenzidine		X
Benzo(b)fluoranthene		
Indeno(1,2,3-cd)pyrene		X
Dibenz(a,h)anthracene		X
Benzo(g,h,i)perylene		X
Associated Samples:	All listed here.	2WTB8(1-3), 2WTB3(4-6), 2WTB3(10-12).

ABN instrument HP5970J (initial calibration date 07/05/90), continued:

Compound	CC 09/24/90	CC 09/27/90
Benzoic acid	XX	X
Hexachlorocyclopentadiene		
2,4-Dinitrophenol		X
4-Nitrophenol		X
4,6-Dinitro-2-methylphenol		
3,3'-Dichlorobenzidine		
Benzo(b)fluoranthene	X	
Indeno(1,2,3-cd)pyrene	X	X
Dibenz(a,h)anthracene	X	
Benzo(g,h,i)perylene	X	
Associated Samples:	None.	2DMW11S(2-4).

ABN instrument HP5970F (initial calibration date 07/09/90):

Compound	CC 09/20/90	CC 09/25/90
bis(2-Chloroisopropyl)ether	XX	XX
n-Nitroso-di-n-propylamine	X	
Benzoic acid		X
2-Methylnaphthalene	X	X
Hexachlorocyclopentadiene	X	
2,4-Dinitrophenol	X	X
4-Nitrophenol	X	X
4-Nitroaniline	X	X
Pyrene	X	X
Indeno(1,2,3-cd)pyrene	X	X
Dibenz(a,h)anthracene	X	X
Benzo(g,h,i)perylene	X	X
*Terphenyl-d14	X	X
Associated Samples:	None.	3MW12S(0-3).

It should be especially noted that the compound terphenyl-d14 is a surrogate standard compound. It is recommended to estimate (J^{25}) positive results for all compounds associated with the out of control surrogate in the affected samples.

X %RSD > 30% or %D > 25%; Estimate (J^3) positive results.
XX %RSD or %D > 50%; Estimate (J^4, UJ^4) positive and non-detected results.
\+ RF < 0.05; Estimate (J^2) positive results and reject (R^2) non-detected results.

Blanks

The VOA, ABN, and PEST fraction low level laboratory method blanks, equipment, field, and trip blanks contained the following maximum quantities of contaminants:

Compound	Maximum [ ]	Action Level
Acetone	12 μg/L	120 μg/Kg
4-Methyl-2-pentanone	6 μg/L	30 μg/Kg
Tetrachloroethene	1 μg/L	5 μg/Kg
1,1,2,2-Tetrachloroethane	1 μg/L	5 μg/Kg
Toluene	1 μg/L	10 μg/Kg
di-n-Butylphthalate	38 μg/Kg	380 μg/Kg

Blank Actions:

- Value < CRQL; report CRQL followed by "U" (U^5).
- Value > CRQL and < action level; report value followed by "U" (U^6).
- Value > CRQL and > action level; report value unqualified.

The action level values were compared to the sample values after application of sample dilution factors, and the following recommendations are made: acetone in sample 2DMW11S(2-4), toluene in samples 2DMW11S(2-4), 2WTB3(15-17), 2WTB3(20-22), 2WTB8(10-12), 2WTB8(10-12)RE, 2WTB8(6-8), 2WTB8(6-8)RE, and 2MW12S(0-3), and tetrachloroethene in sample 2WTB8(1-3) should be reported as the CRQL followed by "U" (U^5); acetone in the samples 2WTB3(15-17), 2WTB3(15-17)RE, 2WTB3(10-12)RE, 2WTB3(20-22), 2WTB3(4-6), 2WTB3(4-6)RE, 2WTB8(10-12), 2WTB8(10-12)RE, 2WTB8(6-8), 2WTB8(6-8)RE, 2WTB9(4-6), 2MW12S(0-3), 2WTB9(4-6)MS, and 2WTB9(4-6)MSD, and toluene in sample 2WTB8(1-3) should be reported as the value followed by "U" (U^6) (i.e., the CRQL has been raised and the value is considered to be non-detect).

It should be noted that several TIC compounds were found in the VOA and ABN fraction method and field blanks. The RTs of the blank TICs were compared to the RTs of the sample TICs, and where similarities were found, the sample TIC result was flagged with a "B" in the TIC Summary Table (Table 1).

In addition, all TIC compounds were flagged on the Forms I in the following way:

"JN" Presumptive evidence for the tentative identification of a compound at an approximate concentration (required flag).

"BR" TIC was also found in an associated method, field, equipment, or trip blank, and is rejected in the sample.

It should be noted that at the request of the client, none of the field, equipment, and trip blanks associated with the samples in this case were validated. Field, equipment, and trip blank results were used as reported by the laboratory on the Forms I, with no evaluation of the accompanying raw data or QC, in order to determine the blank actions applied to the samples.

Method Blank/Spikes

NEESA requires the analysis of method blank/spikes along with the analysis of samples. The results of the method/blank spikes are to be plotted on control charts and submitted with the data package.

For the VOA and ABN fractions, the method blank/spike is essentially the same thing as a method blank. The method blanks submitted by the laboratory may be evaluated as method blank/spikes by plotting the surrogate recovery results on a control chart. In compliance with NEESA requirements, the laboratory did submit control charts which plotted the surrogate recoveries.

For the PEST fraction, a method blank/spike must contain at least two pesticide compounds and/or one PCB compound, and the recovery results are plotted on a control chart.

Although the laboratory did submit control charts depicting the recovery of two pesticide and two PCB compounds, it is unclear where the recovery results were obtained. No raw data or forms were submitted for any QC sample labelled as a method blank/spike or containing the same compounds as are shown on the control charts. It is the validator's understanding that the forms and raw data for the method blank/spikes are a required part of the data package, not just the control charts.

Surrogate Recoveries

The VOA fraction surrogate standard compound toluene-d8 was slightly over-recovered in the soil sample 2WTB3(15-17)RE. It is recommended to estimate (J^7) positive results for all compounds associated with the out of control surrogate in that sample.

All of the ABN and PEST fraction soil surrogate recoveries were within the Contract Required Recovery range (CRR). No action is recommended.

Matrix Spike/Matrix Spike Duplicate

The VOA fraction matrix spike compound chlorobenzene was slightly over-recovered in the MSD. Since that compound was not detected in the native sample, no action is recommended.

The RPD was high for the VOA fraction matrix spike compound 1,1-dichloroethene. Since that compound was not detected in the native sample, no action is necessary.

The ABN fraction matrix spike compound 1,4-dichlorobenzene was slightly under-recovered in the MSD. Since that compound was not detected in the native sample, no action is recommended.

The RPD was high for the PEST fraction matrix spike compound 4,4'-DDT. Since that compound was not detected in the native sample, no action is recommended.

A comparison of the unspiked compounds present in the sample, MS, and MSD yields the following information:

Compound	Sample	MS	MSD	%RSD
Acetone	34	41	68	38%
Carbon disulfide	15	14	17	10
Acenaphthylene	ND	68J	ND	NC
Phenanthrene	110	180	120	28
Anthracene	79J	97J	ND	NC
Fluoranthene	210	300	190	25
Benzo(a)anthracene	190	260	190	19
Chrysene	240	310	220	18
bis(2-Ethylhexyl)phthalate	880	590	610	23
Benzo(b)fluoranthene	190	220	130	25
Benzo(k)fluoranthene	160	270	170	30

All of the %RSDs that could be calculated were less than the criterion of < 50% for soils. No actions are recommended.

Field Duplicate Precision

There were no field duplicate samples submitted with this case.

Internal Standard Performance

All of the VOA fraction internal standard (IS) compounds were under-recovered in the samples 2WTB3(10-12), 2WTB8(10-12), 2WTB8(6-8), 2WTB9(4-6)MSD, and 2WTB3(15-17)RE. It is recommended to estimate (J^{15}, UJ^{15}) all positive and non-detected results in those samples. The IS compounds 1,4-difluorobenzene and chlorobenzene-d5 were slightly under-recovered in the samples 2WTB3(15-17), 2WTB3(4-6), and 2WTB9(4-6)MS, and the IS compound 1,4-difluorobenzene was slightly under-recovered in the sample 2WTB9(4-6). It is recommended to estimate (J^{15}, UJ^{15}) all positive and non-detected results for compounds quantitated from the out of control IS's in those samples.

All ABN fraction IS areas were within the CRR. No action is recommended.

Pesticide Instrument Performance

All DDT RTs were > 12 minutes. All continuing calibration standard compound RTs were within the established RT windows. All DDT and endrin %breakdowns were < 20%. All initial calibration compound %RSDs met the linearity criterion of < 10%. All DBC RT shift %Ds were < 1.5% for wide-bore capillary columns. The laboratory followed the correct 72 hour analytical sequence. No actions are recommended.

The following compounds exceeded the %D criterion of < 15% on the primary (quantitation) column:

Standard	Compound	Associated Samples
09/29/90 21:46	Endosulfan II Methoxychlor	2WTB3(15-17).
09/29/90 22:53	4,4'-DDD	Same.
09/30/90 11:18	Endosulfan II Methoxychlor	2WTB3(15-17), 2WTB3(20-22), 2WTB9(4-6), 2WTB9(4-6)MS/MSD, 2DMW11S(2-4).
09/30/90 12:26	beta-BHC Endrin 4,4'-DDD	Same.
10/01/90 01:58	gamma-BHC Aldrin	2WTB3(20-22), 2WTB9(4-6), 2WTB9(4-6)MS/MSD, 2DMW11S(2-4), 2WTB8(1-3), 3MW12S(0-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12).
10/01/90 03:06	alpha-BHC beta-BHC delta-BHC Aldrin Endrin 4,4'-DDD	Same.
10/01/90 12:08	gamma-BHC Aldrin Endosulfan I	2WTB8(1-3), 3MW12S(0-3), 2WTB8(6-8), 2WTB8(10-12), 2WTB3(4-6), 2WTB3(10-12).
10/01/90 13:16	alpha-BHC beta-BHC delta-BHC Endrin 4,4'-DDD	Same.

It is recommended to estimate (J^{20}) positive results for the out of control compounds in the associated samples.

The following compounds exceeded the %D criterion of < 20% on the secondary (confirmation) column:

Standard	Compound	Associated Samples
10/16/90 22:28	4,4'-DDT Methoxychlor	2WTB8(1-3), 3MW12S(0-3).

It is recommended to estimate (J^{20}) positive results for the out of control compounds in the associated samples.

It should be noted that Form 8D (Linearity Evaluation Check) was not submitted for the secondary column. Although there are no validation criterion for linearity requirements on the secondary column, the form is supposed to be submitted for all columns on which samples were analyzed. No action is necessary.

Compound Identification

In accordance with contractual requirements, mass spectra were submitted for all VOA and ABN compounds detected, whether they were identified as false positives or not. It should be noted that TCL compounds were not labelled on the chromatograms. It is required that TCL compound peaks be identified on the chromatogram either by RT or by compound name.

Mass spectral identifications were generally good, and all VOA and ABN compound RRTs were within $\pm$ 0.06 units of the standard RRT.

PEST fraction compound identifications were good.

Compound Quantitation

VOA, ABN, and PEST fraction sample quantitation calculations were performed correctly.

It should be noted that the VOA fraction compound acetone was reported above the calibration limit of the instrument in the samples 2WTB3(10-12) and 2WTB8(1-3). The sample should have been diluted and rerun to bring acetone within the calibration range. It is recommended to estimate (J^{23}) positive results for acetone in that sample.

Tentatively Identified Compounds

There were no TICs identified in the ABN fraction sample. The TICs identified in the VOA fraction samples are summarized in Table 1.

Data Assessment

This package contains reextraction, reanalysis or dilution. After reviewing the associated QC data, the following recommendations are made:

VOA: **2WTB3(15-17) and 2WTB3(15-17)RE**

- Use all positive and non-detected results from the original analysis.

2WTB3(10-12) and 2WTB3(10-12)RE; 2WTB3(4-6) and 2WTB3(4-6)RE; 2WTB8(10-12) and 2WTB8(10-12)RE; 2WTB8(6-8) and 2WTB8(6-8)RE

- Use all positive and non-detected results from the reanalyses.

ABN: No recommendations are necessary.

PEST: No recommendations are necessary.

INORGANIC DATA

The inorganic data were evaluated based on the following parameters:

- ☺ • Data completeness
- ☺ • Holding times
- ☺ • Calibration verification results
- • Blank results
- • Method blank/spike results
- • Interference check standard results
- • Matrix spike results
- • Field duplicate results
- • Laboratory duplicate results
- ☺ • Laboratory control sample results
- • ICP serial dilution results
- • Furnace AA results
- ☺ • Instrument detection limits
- ☺ • Calculations and transcriptions

☺ - all criteria were met for this parameter.

Data Completeness

The data package contained all required forms and raw data. Copy quality was acceptable. There were numerous values crossed out on the computer generated forms that were marked over with pen, making the forms difficult to read.

Holding Times

Holding times were reviewed and found to meet criteria for all parameters. No action is recommended.

Calibration Verification Results

Initial and continuing verifications were reviewed. All standards had acceptable recoveries and frequency criteria were met. The computer printed CCV values on the Form II were crossed out and handwritten in for antimony and arsenic. The written values did not match those from the raw data. Both the originally reported results and the handwritten results were within the required range, so the data are not affected. No action is recommended.

The CRDL standard was low (76%) for lead for samples in sample delivery group (SDG) 1540. Results less than 3 X CRDL should be considered estimated (J^2) for those analytes due to poor linearity near the CRDL. The 2 X CRDL standard was over-recovered for numerous elements from both SDGs. The table below lists the element, %Rec, and affected SDG.

SDG	Element	%Rec
1540	Copper	133
	Silver	129
	Zinc	126
1543	Beryllium	144
	Chromium	121, 137
	Manganese	147
	Silver	136
	Cadmium	121
	Cobalt	121
	Zinc	124

Positive results less than 3 X CRDL for those compounds in the affected samples should be considered estimated (J^2) due to poor linearity near the CRDL.

Blank Results

The calibration blanks and preparation blanks contained low levels of several metals. The following table lists the maximum concentration of each metal found in any laboratory blank with the resultant action levels. The action level is calculated as 5X the maximum concentration found in any blank. Sample results less than 5X the maximum concentration found in any blank may be due to contamination or instrumental problems, and thus may not be indicative of the actual concentration of the native sample.

Element	Concentration (µg/L)	Action Level (µg/L)
SDG 1540		
Calcium	65.3	327
Copper	22.4	112
Nickel	20.2	101
Potassium	972	4860
Sodium	407	2035
Zinc	11.3	59.0
SDG 1543		
Arsenic	3.0	15.0
Beryllium	2.7	13.5
Calcium	290	1450
Iron	51.2	256
Magnesium	412	2060
Sodium	2654	13270

The above action levels were calculated based on the calibration and preparation blanks only. An equipment blank and a field blank were also analyzed, and the results are listed below.

The following table contains the levels found in equipment blank ER14 and affects samples collected on 08/30/90 and 08/31/90.

Element	Concentration (µg/L)	Action Level (µg/L)
Beryllium	2.3	11.5
Calcium	275	1375
Iron	340	1700
Lead	4.0	20.0
Manganese	7.6	38.0
Sodium	272	1360
Vanadium	35.3	176.5
Zinc	30.5	152.5

The following table contains the levels found in field blank FB3 and affects samples collected on 08/30/90 and 08/31/90.

Element	Concentration (µg/L)	Action Level (µg/L)
Aluminum	102000	510000
Arsenic	4.2	21.0
Beryllium	2.6	13.0
Cadmium	5.3	26.5
Calcium	255	1275
Iron	326	1630
Manganese	7.6	38.0
Potassium	830	4150
Sodium	626	3130
Vanadium	43.6	218
Zinc	60.6	303

The action level values were compared to the sample values after application of sample preparation and dilution factors, and sample results less than the action level were reported as not detected (UJ[3]) (see Sample Data Sheets attached to this report).

It should be noted that, at the client's request, none of the field blank samples from this case were validated. The results reported by the laboratory were used to qualify sample results, but no raw or QC data were inspected to verify the reported field blank results.

Method Blank/Spike Results

A laboratory control sample (LCS) was analyzed with each batch of field samples. The LCS results were plotted on control charts, and satisfy the NEESA QC requirement for the method blank/spike control program. The LCS results are discussed elsewhere in this report.

Interference Check Standard Results

The ICP interference check sample results were reviewed and all recoveries met required criteria. The ICS solutions were analyzed at the proper frequency. Several elements were detected in the ICS solution at greater than 2 X IDL that should not have been present. It is believed that part of the reported value for cadmium for sample 2TB9(4-6) is due to an interference from iron. That sample result should be considered an estimate (J^4), possibly biased high. It is also believed that the entire cadmium result for samples 2DMW11S(2-4) and 3MW12S(0-3) is due to iron interference. It is recommended to report the value flagged "U" (U^4) (i.e., the detection limit has been raised and the value is considered to be non-detect).

Matrix Spike Results

Sample 2WTB9(4-6) was used as the in-house soil spike. The recovery for arsenic was less than 30% (27.8%). Positive and non-detected results for that analyte are rejected (R^4). The recoveries for cadmium and mercury were low (62.6% and 46.3%, respectively). Positive and non-detected results for those analytes should be considered estimates (J^5, UJ^5), possibly biased low. The selenium spike was over-recovered (143.5%). Positive results for that analyte should be considered estimates (J^5), possibly biased high.

Field Duplicate Results

Samples 2WTB3(4-6) and 2WTB9(4-6) were identified as field duplicate samples. Cadmium, mercury, and lead exceeded the RPD criterion of < 30% for aqueous samples. Positive results for those elements have been estimated (J^7) due to poor analytical precision.

Laboratory Duplicate Results

Sample 2TB9(4-6) was used as the in-house soil duplicate. Results for arsenic have been flagged by the laboratory for failing to meet the laboratory criterion for duplicate precision. However, the validation criterion were met, therefore results may be accepted as reported. It is recommended to estimate (J^6) positive results for cadmium since the duplicate results were not within $\pm$ 2 X CRDL.

Laboratory Control Sample Results

The laboratory control sample (LCS) results were reviewed, and the criteria were met for all parameters.

ICP Serial Dilution Results

Sample 2TB9(4-6) was used for the serial dilution analysis. The laboratory was required to flag three elements for failing to meet the required criterion. On the Form IX, aluminum and magnesium should have been flagged "E", but were not. The %D for those two elements meets

the validation criterion of < 15%, so results may accepted as reported. The %D for sodium was high (33%). Positive results greater than 10 X IDL shall be estimated (J^{12}) due to possible chemical/physical interferences.

Furnace AA Results

Furnace AA QC data were reviewed. Duplicate injections and one-point analytical spikes were performed for each sample and analyte. All duplicate injections agreed within ± 20% .

Analytical spike results were reviewed and the following problems were noted:

- Almost all of the spikes for thallium, and most for selenium and antimony were over-recovered. Samples were non-detect, therefore no action is necessary.
- The correlation coefficients were below 0.995 for arsenic for samples 2TB3(20-22) and 2TB9(4-6). Positive results should be considered estimated (J^{11}).

Instrument Detection Limits

Quarterly instrument detection limits (IDLs) were provided, and all detection limit criteria were met.

Calculations and Transcriptions

A spot check of calculations and transcriptions was performed and no problems were noted.

Organic Section prepared by:

JAS for

Elissa McDonagh

Elissa McDonagh
Organic Data Validator

Inorganic Section prepared by:

JAS for

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TABLE 1:

TENTATIVELY IDENTIFIED COMPOUND SUMMARY

Table 1

META Environmental, Inc.

Tentatively Identified Compound Summary

Sample/TIC	2DMW11S(2-4)	2WTB3(10-12)	2WTB3(15-17)	2WTB3(20-22)	2WTB3(4-6)
VOA unknown	XX				
ABN unknown	X	X	XX	XX	X
Unknown aldol	XXB	XXB	X	X	XXB
Unknown hydrocarbon		XX		XX	XX
Terphenyl isomer					
Benzeneacetic acid					
Hexadecanoic acid					
Molecular sulfur					

X = Tentatively Identified Compound (TIC) of this description was found in the sample.
XX = Multiple TICs of this description were found in the sample.
B = A TIC of this description and approximate RT was found in an associated method, field, equipment, or trip blank.

Table 1, Continued

META Environmental, Inc.

Tentatively Identified Compound Summary

Sample/TIC	2WTB8(10-12)	2WTB8(1-3)	2WTB8(6-8)	2WTB9(4-6)	3MW12S(0-3)
VOA unknown					X
ABN unknown	XX	XX	XX	XX	XX
Unknown aldol	XB	XXB	XB	XXB	XXB
Unknown hydrocarbon		XX		XX	XX
Terphenyl isomer				X	
Benzeneacetic acid					X
Hexadecanoic acid					X
Molecular sulfur					X

X = Tentatively Identified Compound (TIC) of this description was found in the sample.
XX = Multiple TICs of this description were found in the sample.
B = A TIC of this description and approximate RT was found in an associated method, field, equipment, or trip blank.

GLOSSARY OF TERMS

GLOSSARY OF TERMS

(In alphabetical order)

ABN	Acid/Base-Neutral. An extraction and analytical method for the determination of semivolatile organic compounds, or a sample extracted and analyzed by that method. Also: BNA, semivolatile, SVOC.
ASP	Analytical Services Protocol. The NYSDEC statement of work.
BFB	Bromofluorobenzene. The compound used for initial tuning of the GC/MS system, prior to the analysis of volatile organic compounds.
CC	Continuing Calibration. A standard solution of organic compounds of known concentration is analyzed periodically to check the continued calibration of the system.
CF	Calibration Factor. In pesticide/PCB analyses, the calibration factor is the area of the standard compound divided by the concentration of that compound in the standard.
CCC	Calibration Check Compound. Any one of a defined subgroup of compounds present in the calibration standards. Used to check the acceptability of instrument performance.
CCV	Continuing Calibration Verfication. A standard solution of inorganic compounds of known concentration is analyzed periodically during sample analyses to verify the continued calibration of the instrument.
CLP	Contract Laboratory Program. The U.S. EPA program that defines analytical, QC, and reporting procedures to generate high quality, defensible data. CLP also has associated the most highly developed and regulated set of data validation guidelines, on which most data validation decisions are based.
COC	Chain of Custody. The documentation that details the history of a given sample, from the time it is collected until the time it has been analyzed.
CRDL	Contract Required Detection Limit. As defned by the U.S. EPA CLP, the minimum concentration at which the laboratory must be able to **accurately** quantitate the inorganic analyte of interest. Results below the CRDL are reported, but as estimated values.

GLOSSARY OF TERMS

CRQL	Contract Required Quantitation Limit. As defined by the U.S. EPA CLP, the minimum concentration at which the laboratory must be able to **accurately** quantitate the organic compound of interest. Results below the CRQL are reported, but as estimated values.
CRR	Contract Required Recovery range. As defined in the U.S. EPA Region I Functional Guidelines for Evaluating Organics Analyses (11/88), the acceptable recovery range for surrogate spike and matrix spike compounds.
DFTPP	Decafluorotriphenylphosphine. The compound used for initial tuning of the GC/MS system, prior to the analysis of semivolatile organic compounds.
EICP	Extracted Ion Current Profiles. Recommended by the U.S. EPA CLP and required by the NYSDEC ASP, the EICP displays the chromatographic peak specific to a m/z ion in a GC/MS analysis.
EPA	Environmental Protection Agency. The United States federal agency governing environmental concerns.
FP	False Positive. Used to designate as non-detect any compound incorrectly identified by the computer.
GC/MS	Gas Chromatography/Mass Spectrometry. An analytical technique used commonly for the determination of volatile and semivolatile organic compounds.
HT	Holding Time. The contractually defined time in which a sample must be extracted and/or analyzed by the analytical laboratory. Generally calculated from date of sampling.
IC	Initial Calibration. A series of standard solutions of organic compounds are analyzed at different concentration levels to define the initial linearity of the analytical system.
ICV	Initial Calibration Verification. A standard solution of inorganic compounds is analyzed immediately following instrument calibration to confirm the accuracy of that calibration.

GLOSSARY OF TERMS

IDL — Instrument Detection Limit. The lowest concentration at which a particular instrument can reliably detect a given analyte. As differs from the CRQL which is the lowest concentration at which a given analyte may be reliably quantitated. IDLs vary from instrument to instrument, and their determination is required by NYSDEC.

MS/MSD — Matrix Spike/Matrix Spike Duplicate. Prior to extraction, a known quantity of several analytes is spiked into a sample. The sample is analyzed in duplicate and %Recs and RPDs are calculated. Used to monitor matrix effects of the native sample upon the observed sample results.

MSB — Matrix Spike Blank. An aliquot of contaminant-free soil or water is spiked with a known quantity of several analytes. The MSB is analyzed and %Recs are calculated. Required by NYSDEC.

NEESA — Naval Energy and Environmental Support Activity. The regulatory agency for the Navy Installation Restoration Program.

NYSDEC — New York State Department of Environmental Conservation. The New York State agency governing environmental concerns.

%D — Percent Difference. A measure of the variance between two results, relative to the first result.

$$\%D = \frac{R_1 - R_2}{R_2} \times 100$$

where, R_1 is the first result and R_2 is the second result.

%Rec — Percent Recovery. A measure of the recovery of a known amount of analyte.

$$\%Rec = \frac{A_r}{A_s} \times 100$$

where, A_r is the amount recovered and A_s is the amount spiked. (When calculating matrix spike recoveries, the amount of analyte present in the unspiked sample must first be subtracted from the amount recovered).

GLOSSARY OF TERMS

%RSD — Percent Relative Standard Deviation. A measure of the variance between multiple results.

$$\%RSD = \frac{SD}{X} \times 100$$

where, SD is the standard deviation and X is the mean of the values.

PEST — Pesticide/PCB. An extraction and analytical method for the detremination of pesticide and/or PCB compounds, or a sample extracted and analyzed by that method. Also: Pest/PCB, PCB.

QA — Quality Assurance. The system of management that guarantees high quality data output.

QC — Quality Control. Any system of analytical tests and checks that monitors the progress of the data, leading to high quality data output. May also refer to the criteria by which those tests and checks are evaluated.

RPD — Relative Percent Difference. A measure of precision comparing two results.

$$RPD = \frac{D_1 - D_2}{(D_1 + D_2)/2} \times 100$$

where, D_1 is the result from sample 1 and D_2 is the result from sample 2.

RRF — Relative Response Factor. A measure of the response of the instrument to a given compound relative to the response of the instrument to a standard compound.

RT — Retention Time. In GC, the time it takes for a given analyte to move through the analytical system to the detector.

SD — Standard Deviation. In statistics, the standard deviation is a measure of the dispersion of all values around the mean value.

GLOSSARY OF TERMS

$$SD = \frac{\sqrt{(n\Sigma x^2 - (\Sigma x)^2)}}{n(n-1)}$$

where n = number of values and x = individual values.

SOW — Statement of Work. A document describing in detail the contractual obligations of the laboratory to the contractor with regards to analytical methods, reporting requirements, and QC, financial, and litigational obligations.

TAL — Target Analyte List. The list that defines the specific inorganic parameters of interest in a given analysis.

TCL — Target Compound List. The list that defines the specific organic compounds of interest in a given analysis.

TIC — Tentatively Identified Compound. Any non-TCL compound which is detected during sample analysis and identified by mass spectral matching alone.

VOA — Volatile Organic Compound Analysis. An analytical method for the determination of volatile organic compounds, or a sample analyzed by that method. Also: VOC.

VTSR — Verified Time of Sample Receipt. The date and time a group of samples is accepted at the analytical laboratory. Appears on the COC. NYSDEC calculates holding times from VTSR rather than from sampling date.

DATA VALIDATION RECOMMENDATION FOOTNOTES - ORGANICS

DATA VALIDATION RECOMMENDATION FOOTNOTES

____	A blank space denotes no change to the laboratory reported result.
J^1, UJ^1	Holding times have been exceeded: estimate positive results (J^1) and non-detects (UJ^1). Refer to Section on "Holding Times" for details.
J^2, R^2	The initial or continuing calibration RF was low: estimate positive results (J^2) and reject non-detects (R^2). Refer to Section on GC/MS "Calibration" for details.
J^3	The initial calibration %RSD was high: estimate positive results (J^3). Refer to Section on GC/MS "Calibration" for details.
J^4, UJ^4	The initial calibration %RSD was greater than 50% or the continuing calibration %D was greater than 25%: estimate positive results (J^4) and non-detects (UJ^4). Refer to Section on GC/MS "Calibration" for details.
U^5	Compound was present in the associated blank. Compound is present in the sample at a concentration less than the CRQL: report the CRQL (U^5). Refer to Section on "Blanks" for details.
U^6	Compound was present in the associated blank. Compound was present in the sample at a concentration higher than the CRQL but lower than the "action level": qualify the result by reporting the value followed by "U" (U^6). (i.e., the Limit of Detection has been raised for that compound, and the result is considered to be non-detect). Refer to Section on "Blanks" for details.
J^7	One or more of the surrogate standard %Recs was greater than the Contract Required Recovery range (CRR): estimate positive results within that area of the chromatogram (J^7). Refer to Section on "Surrogate Recoveries" for details.
J^8, UJ^8	One or more of the surrogate standard %Recs was less than the CRR: estimate positive results (J^8) and non-detects (UJ^8) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.
J^9	One or more of the surrogate standard %Recs was less than 10%: estimate positive results (J^9) and reject non-detects (R^3) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.

DATA VALIDATION RECOMMENDATION FOOTNOTES

J^{10} The Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) %Recs were not within the CRR for this compound: estimate positive results in the unspiked sample (J^{10}). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{11} The MS and/or MSD %Recs were less than 10% for this compound: estimate positive results in the unspiked sample (J^{11}) and reject non-detects (R^4). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{12} The MS/MSD %RPD for this compound was high: estimate positive results in the unspiked sample (J^{12}). Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{13} Field duplicate %RPD was high for this compound: estimate positive results for this compound in the sample and duplicate (J^{13}). Refer to Section on "Field Duplicates" for details.

J^{14}, UJ^{14} One value was non-detect and the other value was greater than the CRQL for this compound in the field duplicate pair: estimate the positive (J^{14}) and non-detected (UJ^{14}) results for that compound. Refer to Section on "Field Duplicates" for details.

J^{15}, UJ^{15} One or more Internal Standard (IS) areas were not within the CRR: estimate positive results (J^{15}) and non-detects (UJ^{15}) for all compounds quantitated from that IS. Refer to Section on "Internal Standard Performance" for details.

J^{16}, R^5 One or more IS areas were grossly low: estimate (J^{16}) positive results and reject (R^5) non-detected results for all compounds quantitated from that IS. Refer to Section on "Internal Standard Performance" for details.

J^{17}, JN^{17}, R^6 % Breakdown for DDT exceeded 20%: estimate positive results for DDT (J^{17}), DDD, and DDE (JN^{17}) in all associated samples. If no DDT is present, but DDD and/or DDE are present: reject the CRQL (R^6) for DDT. Refer to Section on "Pesticide Instrument Performance" for details.

J^{18}, JN^{18}, R^7 % Breakdown for endrin exceeded 20%: estimate positive results for endrin (J^{18}), and endrin ketone (JN^{18}) in all associated samples. If no endrin is present, but endrin ketone and/or endrin aldehyde are present: reject the CRQL (R^7) for endrin. Refer to Section on "Pesticide Instrument Performance" for details.

DATA VALIDATION RECOMMENDATION FOOTNOTES

J^{19} Initial calibration %RSD for this compound exceeded 10%: estimate positive results (J^{19}) for this compound in associated samples. Refer to Section on "Pesticide Instrument Performance" for details.

J^{20} Continuing calibration %D for this compound exceeded 15% (quantitation column) and/or 20% (confirmation column): estimate positive results (J^{20}) for this compound in associated samples. Refer to Section on "Pesticide Instrument Performance" for details.

J^{21} The %RSD for this unspiked compound in the sample/MS/MSD set exceeded the advisory criterion of < 30% for aqueous samples or < 50% for soil samples: estimate (J^{21}) positive results for that compound in the sample, MS, and MSD. Refer to Section on "Matrix Spike/Matrix Spike Duplicate" for details.

J^{23} The compound result was outside the calibration range of the instrument, and the sample should have been diluted and reanalyzed: estimate (J^{23}) positive results for the affected compound. Refer to Section on "Compound Quantitation" for details.

J^{24}, UJ^{24} Samples were analyzed outside of the required 12 hours from the last tune: estimate (J^{24}, UJ^{24}) positive and non-detected results in the affected samples. Refer to Section on "GC/MS Tuning" for details.

J^{25} The continuing calibration %D was high for a surrogate standard compound: estimate (J^{25}) positive results for all compounds associated with the out of control surrogate in the affected sample. Refer to Section on GC/MS "Calibration" for details.

R^1 Holding times have been grossly exceeded: reject all non-detects (R^1).

R^2 The initial or continuing calibration RFs were low: estimate positive results (J^2) and reject non-detects (R^2). Refer to Section on "GC/MS Calibration" for details.

R^3 One or more of the surrogate standard %Recs was less than 10%: estimate positive results (J^9) and reject non-detects (R^3) within that area of the chromatogram. Refer to Section on "Surrogate Recoveries" for details.

R^4 The MS and/or MSD %Recs were less than 10% for this compound: estimate positive results in the unspiked sample (J^{11}) and reject non-detects (R^4). Refer to

DATA VALIDATION RECOMMENDATION FOOTNOTES

Section on "Matrix Spike/Matrix Spike Duplicate" for details.

R^5 One or more IS areas were grossly low: reject non-detects (R^5). Refer to Section on "Internal Standard Performance" for details.

R^6 % Breakdown for DDT was greater than 20%: estimate positive results for DDT (J^{17}), DDD, and DDE (JN^{17}) in all associated samples. If no DDT is present, but DDD and/or DDE are present: reject the CRQL (R^6) for DDT. Refer to Section on "Pesticide Instrument Performance" for details.

R^7 % Breakdown for endrin was greater than 20%: estimate positive results for endrin (J^{18}) and endrin ketone (JN^{18}) in all associated samples. If no endrin is present, but endrin ketone and/or endrin aldehyde are present: reject the CRQL (R^7) for endrin. Refer to Section on "Pesticide Instrument Performance" for details.

R^9 Sample was analyzed grossly outside of the required 12 hours from the last tune: estimate (J^{24}) positive results and reject (R^9) non-detected results in the affected samples. Refer to Section on "GC/MS Tuning" for details.

SAMPLE DATA SHEETS:

VOLATILE ORGANIC COMPOUNDS

META Environmental, Inc.
Sample Data Sheets: V latile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2DMW11S(2-4)			2WTB3(15-17)			2WTB3(15-17)RE			2WTB3(10-12)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	14			18			18		UJ15	17		UJ15,24
Bromomethane	14			18		UJ4	18		UJ4,15	17		UJ4,15,24
Vinyl Chloride	14			18			18		UJ15	17		UJ15,24
Chloroethane	14			18			18		UJ15	17		UJ15,24
Methylene Chloride	7			9			9		UJ15	9		UJ15,24
Acetone	14	13J	14U5	18	47	J3,47U6	18	45	J15,45U6	17	350	J3,15,23,24
Carbon Disulfide	7			9	16		9	24	J15	9	15	J15,24
1,1-Dichloroethene	7			9			9		UJ15	9		UJ15,24
1,1-Dichloroethane	7			9			9		UJ15	9		UJ15,24
1,2- Dichloroethene(total)	7			9			9		UJ15	9		UJ15,24
Chloroform	7			9			9		UJ15	9		UJ15,24
1,2-Dichloroethane	7			9			9		UJ15	9		UJ15,24
2-Butanone	14			18	12J	J3	18		UJ15	17	17J	J3,15,24
1,1,1-Trichloroethane	7			9		UJ15	9		UJ15	9		UJ15,24
Carbon Tetrachloride	7			9		UJ15	9		UJ15	9		UJ15,24
Vinyl Acetate	14			18		UJ15	18		UJ15	17		UJ15,24
Bromodichloromethane	7			9		UJ15	9		UJ15	9		UJ15,24
1,2-Dichloropropane	7			9		UJ15	9		UJ15	9		UJ15,24
cis-1,3-Dichloropropene	7			9		UJ15	9		UJ15	9		UJ15,24
Trichlorethene	7			9		UJ15	9		UJ15	9		UJ15,24
Dibromochloromethane	7			9		UJ15	9		UJ15	9		UJ15,24
1,1,2-Trichloroethane	7			9		UJ15	9		UJ15	9		UJ15,24
Benzene	7			9		UJ15	9		UJ15	9		UJ15,24
trans-1,3-Dichloropropene	7			9		UJ15	9		UJ15	9		UJ15,24
Bromoform	7			9		UJ15	9		UJ15	9		UJ15,24
4-Methyl-2-pentanone	14			18		UJ15	18		UJ15	17		UJ15,24
2-Hexanone	14			18		UJ15	18		UJ15	17		UJ15,24
Tetrachloroethane	7			9		UJ15	9		UJ15	9		UJ15,24
1,1,2,2-Tetrachloroethane	7			9		UJ15	9		UJ15	9		UJ15,24
Toluene	7	4J	7U5	9	2J	J15, 9U5	9		UJ15	9		UJ15,24
Chlorobenzene	7			9		UJ15	9		UJ15	9		UJ15,24
Ethylbenzene	7			9		UJ15	9		UJ15	9		UJ15,24
Styrene	7			9		UJ15	9		UJ15	9		UJ15,24
Total Xylenes	7			9		UJ15	9		UJ15	9		UJ15,24
Dilution Factor:		1			1			1			1	
Matrix:		Soil			Soil			Soil			Soil	
Units:		ug/Kg			ug/Kg			ug/Kg			ug/Kg	

META

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB3(10-12)RE			2WTB3(20-22)			2WTB3(4-6)			2WTB3(4-6)RE		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	17			17			19			19		
Bromomethane	17		UJ4	17			19		UJ4	19		UJ4
Vinyl Chloride	17			17			19			19		
Chloroethane	17			17			19			19		
Methylene Chloride	9			8	2J		9			9		
Acetone	17	71	71U6	17	18	18U6	19	100	J3,100U6	19	85	85U6
Carbon Disulfide	9	15		8	9		9	23		9	20	
1,1-Dichloroethene	9			8			9			9		
1,1-Dichloroethane	9			8			9			9		
1,2- Dichloroethene(total)	9			8			9			9		
Chloroform	9			8			9			9		
1,2-Dichloroethane	9			8			9			9		
2-Butanone	17	14J	J3	17			19	20	J3	19	18J	J3
1,1,1-Trichloroethane	9			8			9		UJ15	9		
Carbon Tetrachloride	9			8			9		UJ15	9		
Vinyl Acetate	17			17			19		UJ15	19		
Bromodichloromethane	9			8			9		UJ15	9		
1,2-Dichloropropane	9			8			9		UJ15	9		
cis-1,3-Dichloropropene	9			8			9		UJ15	9		
Trichlorethene	9			8			9		UJ15	9		
Dibromochloromethane	9			8			9		UJ15	9		
1,1,2-Trichloroethane	9			8			9		UJ15	9		
Benzene	9			8			9		UJ15	9		
trans-1,3-Dichloropropene	9			8			9		UJ15	9		
Bromoform	9			8			9		UJ15	9		
4-Methyl-2-pentanone	17			17			19		UJ15	19		
2-Hexanone	17			17			19		UJ15	19		
Tetrachloroethane	9			8			9		UJ15	9		
1,1,2,2-Tetrachloroethane	9			8			9		UJ15	9		
Toluene	9			8	2J	8U5	9		UJ15	9		
Chlorobenzene	9			8			9		UJ15	9		
Ethylbenzene	9			8			9		UJ15	9		
Styrene	9			8			9		UJ15	9		
Total Xylenes	9			8			9		UJ15	9		
Dilution Factor:		1			1			1			1	
Matrix:		Soil			Soil			Soil			Soil	
Units:		ug/Kg			ug/Kg			ug/Kg			ug/Kg	

META

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB8(1-3)			2WTB8(10-12)			2WTB8(10-12)RE			2WTB8(6-8)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	20			20		UJ15	20			19		UJ15
Bromomethane	20		UJ4	20		UJ4,15	20		UJ4	19		UJ4,15
Vinyl Chloride	20			20		UJ15	20			19		UJ15
Chloroethane	20			20		UJ15	20			19		UJ15
Methylene Chloride	10	4J		10		UJ15	10			9		UJ15
Acetone	20	850	J3,23	20	56	J3,15, 56U6	20	43	43U6	19	50	J3,15, 50U6
Carbon Disulfide	10	8J		10	14	J15	10	23		9	15	J15
1,1-Dichloroethene	10			10		UJ15	10			9		UJ15
1,1-Dichloroethane	10			10		UJ15	10			9		UJ15
1,2- Dichloroethene(total)	10			10		UJ15	10			9		UJ15
Chloroform	10			10		UJ15	10			9		UJ15
1,2-Dichloroethane	10			10		UJ15	10			9		UJ15
2-Butanone	20	310	J3	20	14J	J3,15	20	10J	J3	19		UJ15
1,1,1-Trichloroethane	10			10		UJ15	10			9		UJ15
Carbon Tetrachloride	10			10		UJ15	10			9		UJ15
Vinyl Acetate	20			20		UJ15	20			19		UJ15
Bromodichloromethane	10			10		UJ15	10			9		UJ15
1,2-Dichloropropane	10			10		UJ15	10			9		UJ15
cis-1,3-Dichloropropene	10			10		UJ15	10			9		UJ15
Trichlorethene	10			10		UJ15	10			9		UJ15
Dibromochloromethane	10			10		UJ15	10			9		UJ15
1,1,2-Trichloroethane	10			10		UJ15	10			9		UJ15
Benzene	10			10		UJ15	10			9		UJ15
trans-1,3-Dichloropropene	10			10		UJ15	10			9		UJ15
Bromoform	10			10		UJ15	10			9		UJ15
4-Methyl-2-pentanone	20			20		UJ15	20			19		UJ15
2-Hexanone	20			20		UJ15	20			19		UJ15
Tetrachloroethane	10	7J	J3,10U5	10		UJ15	10			9		UJ15
1,1,2,2-Tetrachloroethane	10			10		UJ15	10			9		UJ15
Toluene	10	10J	10U6	10	2J	J15, 10U5	10	2J	10U5	9	3J	J15, 9U5
Chlorobenzene	10			10		UJ15	10			9		UJ15
Ethylbenzene	10			10		UJ15	10			9		UJ15
Styrene	10			10		UJ15	10			9		UJ15
Total Xylenes	10			10		UJ15	10			9		UJ15
Dilution Factor:		1			1			1			1	
Matrix:		Soil			Soil			Soil			Soil	
Units:		ug/Kg			ug/Kg			ug/Kg			ug/Kg	

META

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB8(6-8)RE			2WTB9(4-6)			3MW12S(0-3)			2WTB9(4-6)MS		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	19			18		R9	15			18		R9
Bromomethane	19		UJ4	18		R9	15			18		R9
Vinyl Chloride	19			18		R9	15			18		R9
Chloroethane	19			18		R9	15			18		R9
Methylene Chloride	9			9		R9	8			9		R9
Acetone	19	70	70U6	18	34	J24, 26, 34U6	15	32	32U6	18	41	J24,26, 41U6
Carbon Disulfide	9	12		9	15	J24,26	8			9	14	J24,26
1,1-Dichloroethene	9			9		R9	8			9	*	J24,26
1,1-Dichloroethane	9			9		R9	8			9		R9
1,2- Dichloroethene(total)	9			9		R9	8			9		R9
Chloroform	9			9		R9	8			9		R9
1,2-Dichloroethane	9			9		R9	8			9		R9
2-Butanone	19	16J	J3	18		R9	15	32		18		R9
1,1,1-Trichloroethane	9			9		UJ15,R9	8			9		UJ15,R9
Carbon Tetrachloride	9			9		UJ15,R9	8			9		UJ15,R9
Vinyl Acetate	19			18		UJ15,R9	15			18		UJ15,R9
Bromodichloromethane	9			9		UJ15,R9	8			9		UJ15,R9
1,2-Dichloropropane	9			9		UJ15,R9	8			9		UJ15,R9
cis-1,3-Dichloropropene	9			9		UJ15,R9	8			9		UJ15,R9
Trichlorethene	9			9		UJ15,R9	8			9	*	J15,24,26
Dibromochloromethane	9			9		UJ15,R9	8			9		UJ15,R9
1,1,2-Trichloroethane	9			9		UJ15,R9	8			9		UJ15,R9
Benzene	9			9		UJ15,R9	8			9	*	J15,24,26
trans-1,3-Dichloropropene	9			9		UJ15,R9	8			9		UJ15,R9
Bromoform	9			9		UJ15,R9	8			9		UJ15,R9
4-Methyl-2-pentanone	19			18		R9	15			18		UJ15,R9
2-Hexanone	19			18		R9	15			18		UJ15,R9
Tetrachloroethane	9			9		R9	8			9		UJ15,R9
1,1,2,2-Tetrachloroethane	9			9		R9	8			9		UJ15,R9
Toluene	9	2J	9U5	9		R9	8	2J	8U5	9	*	J15,24,26
Chlorobenzene	9			9		R9	8			9	*	J15,24,26
Ethylbenzene	9			9		R9	8			9		UJ15,R9
Styrene	9			9		R9	8			9		UJ15,R9
Total Xylenes	9			9		R9	8			9		UJ15,R9
Dilution Factor:		1			1			1			1	
Matrix:		Soil			Soil			Soil			Soil	
Units:		ug/Kg			ug/Kg			ug/Kg			ug/Kg	

Indicates matrix spike compound

META Environmental, Inc.
Sample Data Sheets: Volatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB9(4-6)MSD											
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Chloromethane	18		UJ15,R9	11			12			14		
Bromomethane	18		UJ15,R9	11			12			14		
Vinyl Chloride	18		UJ15,R9	11			12			14		
Chloroethane	18		UJ15,R9	11			12			14		
Methylene Chloride	9		UJ15,R9	6			6			7		
Acetone	18	68	J15,24,26 68U6	11			12			14		
Carbon Disulfide	9	17	J15,24,26	6			6			7		
1,1-Dichloroethene	9	*	J15,24,26	6			6			7		
1,1-Dichloroethane	9		UJ15,R9	6			6			7		
1,2- Dichloroethene(total)	9		UJ15,R9	6			6			7		
Chloroform	9		UJ15,R9	6			6			7		
1,2-Dichloroethane	9		UJ15,R9	6			6			7		
2-Butanone	18		UJ15,R9	11			12			14		
1,1,1-Trichloroethane	9		UJ15,R9	6			6			7		
Carbon Tetrachloride	9		UJ15,R9	6			6			7		
Vinyl Acetate	18		UJ15,R9	11			12			14		
Bromodichloromethane	9		UJ15,R9	6			6			7		
1,2-Dichloropropane	9		UJ15,R9	6			6			7		
cis-1,3-Dichloropropene	9		UJ15,R9	6			6			7		
Trichlorethene	9	*	J15,24,26	6			6			7		
Dibromochloromethane	9		UJ15,R9	6			6			7		
1,1,2-Trichloroethane	9		UJ15,R9	6			6			7		
Benzene	9	*	J15,24,26	6			6			7		
trans-1,3-Dichloropropene	9		UJ15,R9	6			6			7		
Bromoform	9		UJ15,R9	6			6			7		
4-Methyl-2-pentanone	18		UJ15,R9	11			12			14		
2-Hexanone	18		UJ15,R9	11			12			14		
Tetrachloroethane	9		UJ15,R9	6			6			7		
1,1,2,2-Tetrachloroethane	9		UJ15,R9	6			6			7		
Toluene	9	*	J15,24,26	6			6			7		
Chlorobenzene	9	*	J15,24,26	6			6			7		
Ethylbenzene	9		UJ15,R9	6			6			7		
Styrene	9		UJ15,R9	6			6			7		
Total Xylenes	9		UJ15,R9	6			6			7		
Dilution Factor:	1											
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

* Indicates matrix spike compound

META

SAMPLE DATA SHEETS:

SEMIVOLATILE ORGANIC COMPOUNDS

META Envir nmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2DMW11S(2-4)			2WTB3(10-12)			2WTB3(15-17)			2WTB3(20-22)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Phenol	460			570			580			550		
bis(2-Chloroethyl)ether	460			570			580			550		
2-Chlorophenol	460			570			580			550		
1,3-Dichlorobenzene	460			570			580			550		
1,4-Dichlorobenzene	460			570			580			550		
Benzyl Alcohol	460			570			580			550		
1,2-Dichlorobenzene	460			570			580			550		
2-Methylphenol	460			570			580			550		
bis(2-chloroisopropyl)ether	460			570			580			550		
4-Methylphenol	460			570			580			550		
n-Nitroso-di-n-propylamine	460			570			580			550		
Hexachloroethane	460			570			580			550		
Nitrobenzene	460			570			580			550		
Isophorone	460			570			580			550		
2-Nitrophenol	460			570			580			550		
2,4-Dimethylphenol	460			570			580			550		
Benzoic Acid	2200			2800		UJ4	580			2700		
bis(2-Chloroethoxy)methane	460			570			2800			550		
2,4-Dichlorophenol	460			570			580			550		
1,2,4-Trichlorobenzene	460			570			580			550		
Naphthalene	460			570			580			550		
4-Chloroaniline	460			570			580			550		
Hexachlorobutadiene	460			570			580			550		
4-Chloro-3-methylphenol	460			570			580			550		
2-Methylnaphthalene	460			570			580			550		
Hexachlorocyclopentadiene	460			570			580			550		
2,4,6-Trichlorophenol	460			570			580			550		
2,4,5-Trichlorophenol	2200			2800			2800			2700		
2-Chloronaphthalene	460			570			580			550		
2-Nitroaniline	2200			2800			2800			2700		
Dimethylphthalate	460			570			580			550		
Acenaphthalene	460			570			580			550		
2,6-Dinitrotoluene	460			570			580			550		

META Environmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2DMW11S(2-4)			2WTB3(10-12)			2WTB3(15-17)			2WTB3(20-22)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
3-Nitroaniline	2200			2800			2800			2700		
Acenaphthene	460			570			580			550		
2,4-Dinitrophenol	2200			2800			2800			2700		
4-Nitrophenol	2200			2800			2800			2700		
Dibenzofuran	460			570			580			550		
2,4-Dinitrotoluene	460			570			580			550		
Diethylphthalate	460			570			580			550		
4-Chlorophenyl-phenylether	460			570			580			550		
Fluorene	460			570			580			550		
4-Nitroaniline	2200			2800			2800			2700		
4,6-Dinitro-2-methylphenol	2200			2800			2800			2700		
n-Nitrosodiphenylamine	460			570			580			550		
4-Bromophenyl-phenylether	460			570			580			550		
Hexachlorobenzene	460			570			580			550		
Pentachlorophenol	2200			2800			2800			2700		
Phenanthrene	460			570	120J		580			550	67J	
Anthracene	460			570			580			550		
di-n-Butylphthalate	460			570			580			550		
Fluoranthene	460			570	170J		580	68J		550	120J	
Pyrene	460			570	370J		580	99J		550	190J	
Butylbenzylphthalate	460			570			580			550		
3,3'-Dichlorobenzidine	920			1100			1200			1100		
Benzo(a)anthracene	460			570	170J		580			550		
Chrysene	460			570	220J		580			550		
bis(2-Ethylhexyl)phthalate	460	140J		570	280J		580	210J		550		
di-n-Octylphthalate	460			570			580			550		
Benzo(b)fluoranthene	460			570	190J		580			550		
Benzo(k)fluoranthene	460			570	130J		580			550		
Benzo(a)pyrene	460			570	180J		580			550		
Indeno(1,2,3-cd)pyrene	460			570			580			550		
Dibenzo(a,h)anthracene	460			570			580			550		
Benzo(g,h,i)perylene	460			570			580			550		
Dilution Factor:		1			1			1			1	
Matrix:		Soil			Soil			Soil			Soil	
Units:		ug/Kg			ug/Kg			ug/Kg			ug/Kg	

META

META Environmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2WTB3(4-6)			2WTB8(10-12)			2WTB8(1-3)			2WTB8(6-8)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Phenol	620			650			670			620		
bis(2-Chloroethyl)ether	620			650			670			620		
2-Chlorophenol	620			650			670			620		
1,3-Dichlorobenzene	620			650			670			620		
1,4-Dichlorobenzene	620			650			670			620		
Benzyl Alcohol	620			650			670			620		
1,2-Dichlorobenzene	620			650			670			620		
2-Methylphenol	620			650			670			620		
bis(2-chloroisopropyl)ether	620			650			670			620		
4-Methylphenol	620			650			670			620		
n-Nitroso-di-n-propylamine	620			650			670			620		
Hexachloroethane	620			650			670			620		
Nitrobenzene	620			650			670			620		
Isophorone	620			650			670			620		
2-Nitrophenol	620			650			670			620		
2,4-Dimethylphenol	620			650			670			620		
Benzoic Acid	3000		UJ4	3100			3300		UJ4	3000		
bis(2-Chloroethoxy)methane	620			650			670			620		
2,4-Dichlorophenol	620			650			670			620		
1,2,4-Trichlorobenzene	620			650			670			620		
Naphthalene	620			650			670			620		
4-Chloroaniline	620			650			670			620		
Hexachlorobutadiene	620			650			670			620		
4-Chloro-3-methylphenol	620			650			670			620		
2-Methylnaphthalene	620			650			670			620		
Hexachlorocyclopentadiene	620			650			670			620		
2,4,6-Trichlorophenol	620			650			670			620		
2,4,5-Trichlorophenol	3000			3100			3300			3000		
2-Chloronaphthalene	620			650			670			620		
2-Nitroaniline	3000			3100			3300			3000		
Dimethylphthalate	620			650			670			620		
Acenaphthalene	620			650			670	120J		620		
2,6-Dinitrotoluene	620			650			670			620		

META

META Environmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2WTB3(4-6)			2WTB8(10-12)			2WTB8(1-3)			2WTB8(6-8)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
3-Nitroaniline	3000			3100			3300			3000		
Acenaphthene	620			650			670			620		
2,4-Dinitrophenol	3000			3100			3300			3000		
4-Nitrophenol	3000			3100			3300			3000		
Dibenzofuran	620			650			670			620		
2,4-Dinitrotoluene	620			650			670			620		
Diethylphthalate	620			650			670			620		
4-Chlorophenyl-phenylether	620			650			670			620		
Fluorene	620			650			670			620		
4-Nitroaniline	3000			3100			3300			3000		
4,6-Dinitro-2-methylphenol	3000			3100			3300			3000		
n-Nitrosodiphenylamine	620			650			670			620		
4-Bromophenyl-phenylether	620			650			670			620		
Hexachlorobenzene	620			650			670			620		
Pentachlorophenol	3000			3100			3300			3000		
Phenanthrene	620	85J		650			670	340J		620		
Anthracene	620			650			670	79J		620		
di-n-Butylphthalate	620			650			670			620		
Fluoranthene	620	130J		650	120J		670	600J		620	110J	
Pyrene	620	250J		650	160J		670	570J		620	120J	
Butylbenzylphthalate	620			650			670			620		
3,3'-Dichlorobenzidine	1200			1300			1300			1200		
Benzo(a)anthracene	620	120J		650			670	370J		620		
Chrysene	620	150J		650			670	600J		620		
bis(2-Ethylhexyl)phthalate	620	510J		650	500J		670			620	130J	
di-n-Octylphthalate	620			650			670			620		
Benzo(b)fluoranthene	620			650			670	550J		620		
Benzo(k)fluoranthene	620			650			670	390J		620		
Benzo(a)pyrene	620			650			670	390J		620		
Indeno(1,2,3-cd)pyrene	620			650			670	270J	J3	620		
Dibenzo(a,h)anthracene	620			650			670			620		
Benzo(g,h,i)perylene	620			650			670			620		
Dilution Factor:	1			10			1			1		
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

META

META Environmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2WTB9(4-6)			3MW12S(0-3)			2WTB9(4-6)MS			2WTB9(4-6)MSD		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
Phenol	600			500			600	*		600	*	
bis(2-Chloroethyl)ether	600			500			600			600		
2-Chlorophenol	600			500			600	*		600	*	
1,3-Dichlorobenzene	600			500			600			600		
1,4-Dichlorobenzene	600			500			600	*		600	*	
Benzyl Alcohol	600			500			600			600		
1,2-Dichlorobenzene	600			500			600			600		
2-Methylphenol	600			500			600			600		
bis(2-chloroisopropyl)ether	600			500		UJ4	600			600		
4-Methylphenol	600			500			600			600		
n-Nitroso-di-n-propylamine	600			500			600	*		600	*	
Hexachloroethane	600			500			600			600		
Nitrobenzene	600			500			600			600		
Isophorone	600			500			600			600		
2-Nitrophenol	600			500			600			600		
2,4-Dimethylphenol	600			500			600			600		
Benzoic Acid	2900			2400	82J	J3	2900			2900		
bis(2-Chloroethoxy)methane	600			500			600			600		
2,4-Dichlorophenol	600			500			600			600		
1,2,4-Trichlorobenzene	600			500			600	*		600	*	
Naphthalene	600			500			600			600		
4-Chloroaniline	600			500			600			600		
Hexachlorobutadiene	600			500			600			600		
4-Chloro-3-methylphenol	600			500			600	*		600	*	
2-Methylnaphthalene	600			500			600			600		
Hexachlorocyclopentadiene	600			500			600			600		
2,4,6-Trichlorophenol	600			500			600			600		
2,4,5-Trichlorophenol	2900			2400			2900			2900		
2-Chloronaphthalene	600			500			600			600		
2-Nitroaniline	2900			2400			2900			2900		
Dimethylphthalate	600			500			600			600		
Acenaphthalene	600			500			600	68J		600		
2,6-Dinitrotoluene	600			500			600			600		

META Environmental, Inc.
Sample Data Sheets: Semivolatile Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:	2WTB9(4-6)			3MW12S(0-3)			2WTB9(4-6)MS			2WTB9(4-6)MSD		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
3-Nitroaniline	2900			2400			2900			2900		
Acenaphthene	600			500			600	*		600	*	
2,4-Dinitrophenol	2900			2400			2900			2900		
4-Nitrophenol	2900			2400			2900	*		2900	*	
Dibenzofuran	600			500			600			600		
2,4-Dinitrotoluene	600			500			600			600		
Diethylphthalate	600			500			600			600		
4-Chlorophenyl-phenylether	600			500			600			600		
Fluorene	600			500			600			600		
4-Nitroaniline	2900			2400			2900			2900		
4,6-Dinitro-2-methylphenol	2900			2400			2900			2900		
n-Nitrosodiphenylamine	600			500			600			600		
4-Bromophenyl-phenylether	600			500			600			600		
Hexachlorobenzene	600			500			600			600		
Pentachlorophenol	2900			2400			2900	*		2900	*	
Phenanthrene	600	110J		500			600	180J		600	120J	
Anthracene	600	79J		500			600	97J		600		
di-n-Butylphthalate	600			500			600			600		
Fluoranthene	600	210J		500	67J	J25	600	300J		600	190J	
Pyrene	600	440J		500	54J	J3,25	600	*		600	*	
Butylbenzylphthalate	600			500			600			600		
3,3'-Dichlorobenzidine	1200			1000			1200			1200		
Benzo(a)anthracene	600	190J		500			600	260J		600	190J	
Chrysene	600	240J		500			600	310J		600	220J	
bis(2-Ethylhexyl)phthalate	600	880		500	160J	J25	600	590J		600	610	
di-n-Octylphthalate	600			500			600			600		
Benzo(b)fluoranthene	600	190J		500			600	220J		600	130J	
Benzo(k)fluoranthene	600	160J		500	50J	J25	600	270J		600	170J	
Benzo(a)pyrene	600			500			600			600		
Indeno(1,2,3-cd)pyrene	600			500			600			600		
Dibenzo(a,h)anthracene	600			500			600			600		
Benzo(g,h,i)perylene	600			500			600			600		
Dilution Factor:	1			1			1			1		
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

* Indicates matrix spike compound

META

SAMPLE DATA SHEETS:

PESTICIDE ORGANIC COMPOUNDS

META Environmental, Inc.
Sample Data Sheets: Pesticide Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2DMW11S(2-4)			2WTB3(10-12)			2WTB3(15-17)			2WTB3(20-22)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
alpha-BHC	11		UJ1	14			14			14		
beta-BHC	11		UJ1	14			14			14		
delta-BHC	11		UJ1	14			14			14		
gamma-BHC (Lindane)	11		UJ1	14			14			14		
Heptachlor	11		UJ1	14			14			14		
Aldrin	11		UJ1	14			14			14		
Heptachlor epoxide	11		UJ1	14			14			14		
Endosulfan I	11		UJ1	14			14			14		
Dieldrin	22		UJ1	28			28			28		
4,4'-DDE	22		UJ1	28			28			28		
Endrin	22		UJ1	28			28			28		
Endosulfan II	22		UJ1	28			28			28		
4,4'-DDD	22		UJ1	28			28			28		
Endosulfan sulfate	22		UJ1	28			28			28		
4,4'-DDT	22		UJ1	28			28			28		
Methoxychlor	110		UJ1	140			140			140		
Endrin ketone	22		UJ1	28			28			28		
alpha-Chlordane	110		UJ1	140			140			140		
gamma-Chlordane	110		UJ1	140			140			140		
Toxaphene	220		UJ1	280			280			280		
Aroclor-1016	110		UJ1	140			140			140		
Aroclor-1221	110		UJ1	140			140			140		
Aroclor-1232	110		UJ1	140			140			140		
Aroclor-1242	110		UJ1	140			140			140		
Aroclor-1248	110		UJ1	140			140			140		
Aroclor-1254	220		UJ1	280			280			280		
Aroclor-1260	220		UJ1	280			280			280		
Dilution Factor:	1			1			1			1		
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

META

META Environmental, Inc.
Sample Data Sheets: Pesticide Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB3(4-6)			2WTB8(10-12)			2WTB8(1-3)			2WTB8(6-8)		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
alpha-BHC	15			16			16			15		
beta-BHC	15			16			16			15		
delta-BHC	15			16			16			15		
gamma-BHC (Lindane)	15			16			16			15		
Heptachlor	15			16			16			15		
Aldrin	15			16			16			15		
Heptachlor epoxide	15			16			16			15		
Endosulfan I	15			16			16			15		
Dieldrin	30			31			33			30		
4,4'-DDE	30			31			33			30		
Endrin	30			31			33			30		
Endosulfan II	30			31			33			30		
4,4'-DDD	30			31			33			30		
Endosulfan sulfate	30			31			33			30		
4,4'-DDT	30			31			33			30		
Methoxychlor	150			160			160			150		
Endrin ketone	30			31			33			30		
alpha-Chlordane	150			160			160			150		
gamma-Chlordane	150			160			160			150		
Toxaphene	300			310			330			300		
Aroclor-1016	150			160			160			150		
Aroclor-1221	150			160			160			150		
Aroclor-1232	150			160			160			150		
Aroclor-1242	150			160			160			150		
Aroclor-1248	150			160			160			150		
Aroclor-1254	300			310			330			300		
Aroclor-1260	300			310			330			300		
Dilution Factor:	1			1			1			1		
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

META Environmental, Inc.
Sample Data Sheets: Pesticide Organics Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC Nos.: N008, N011

Sample ID:	2WTB9(4-6)			3MW12S(0-3)			2WTB9(4-6)MS			2WTB9(4-6)MSD		
	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated	CRQL	Reported	Validated
alpha-BHC	14			12		UJ1	14			14		
beta-BHC	14			12		UJ1	14			14		
delta-BHC	14			12		UJ1	14			14		
gamma-BHC (Lindane)	14			12		UJ1	14	*	J20	14	*	J20
Heptachlor	14			12		UJ1	14	*		14	*	
Aldrin	14			12		UJ1	14	*	J20	14	*	J20
Heptachlor epoxide	14			12		UJ1	14			14		
Endosulfan I	14			12		UJ1	14			14		
Dieldrin	28			24		UJ1	28	*		28	*	
4,4'-DDE	28			24	27	J1	28			28		
Endrin	28			24		UJ1	28	*	J20	28	*	J20
Endosulfan II	28			24		UJ1	28			28		
4,4'-DDD	28			24	61	J1,20	28			28		
Endosulfan sulfate	28			24		UJ1	28			28		
4,4'-DDT	28			24	24J	J1,20	28	*		28	*	
Methoxychlor	140			120		UJ1	140			140		
Endrin ketone	28			24		UJ1	28			28		
alpha-Chlordane	140			120		UJ1	140			140		
gamma-Chlordane	140			120		UJ1	140			140		
Toxaphene	280			240		UJ1	280			280		
Aroclor-1016	140			120		UJ1	140			140		
Aroclor-1221	140			120		UJ1	140			140		
Aroclor-1232	140			120		UJ1	140			140		
Aroclor-1242	140			120		UJ1	140			140		
Aroclor-1248	140			120		UJ1	140			140		
Aroclor-1254	280			240		UJ1	280			280		
Aroclor-1260	280			240		UJ1	280			280		
Dilution Factor:	1			1			1			1		
Matrix:	Soil			Soil			Soil			Soil		
Units:	ug/Kg			ug/Kg			ug/Kg			ug/Kg		

* Indicates matrix spike compound

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DATA VALIDATION RECOMMENDATION FOOTNOTES - INORGANICS

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DATA VALIDATION RECOMMENDATION FOOTNOTES - INORGANICS

_____	A blank space denotes no change to the laboratory reported results.
J[1], UJ[1]	Holding times have been exceeded or samples were improperly preserved prior to analysis: estimate positive results (J[1]) and non-detects (UJ[1]). Refer to Section on "Holding Times" for details.
J[2], UJ[2]	Linearity was poor near the CRDL (low levels). Estimate the results. Refer to Section on "Calibration Verification Results" for details.
U[3]	The compound was present in the associated blank. The sample result was less than the action level of 5x the maximum concentration found in any blank, and has been rejected. Alternatively, the associated blank had a value below the negative IDL. The detection limit and/or positive results may be biased low. Refer to Section on "Laboratory Blank Results" for details.
J[4], UJ[4]	The ICS recovery for an element is outside of criteria or interelement interferences were indicated. The reported results or detection limit is estimated. See the Section on "ICP Inference Check Sample Results" for details.
J[5], UJ[5]	The recovery of an element is outside of criteria. The reported results or detection limit is estimated. See the Section on "Matrix Spike Results" for details.
J[6]	The RPD for laboratory duplicate sample analysis results exceeded 20% (35% for soils) for this analyte. The reported results are estimated See the Section on "Laboratory Duplicate Results" for details.
J[7]	The RPD for the field duplicate sample analysis results exceeded 30% (50% for soils) for this analyte. The reported results are estimated. See the Section on "Field Duplicate Results" for details.
J[8], UJ[8]	The LCS recovery for an element is outside of criteria. The reported results or detection limit is estimated. See the Section on "Laboratory Control Sample Results" for details.
J[9]	The %RSD of duplicate injections for GFAA analysis do not agree within $\pm$ 20%. The sample results are estimatedd. See the Section on "Furnace AA Results" for details.

J^{10}, UJ^{10}	The recovery of analytical spikes for GFAA analysis is outside of control limits. Positive sample results or detection limits are estimated. See the Section on "Furnace AA Results" for details.
J^{11}	The sample required MSA which either was not performed, was performed incorrectly, or the correlation coefficient was < 0.995. The positive results are estimated. See the Section on "Furnace AA Results" for details.
J^{12}, UJ^{12}	The results of the ICP Serial Dilution experiment was outside of criteria. Positive sample results or detection limits are estimated. See the Section on "ICP Serial Dilution Results" for details.
J^{13}	Element should have been run by GFAA. The reported value is an estimate.
J^{14}	The sample was less than 50% solids. Analysis using a method intended for soils might not give representative results. The results are estimated.
R^1	Holding times have been grossly exceeded. Reject all non-detects.
R^2	Instrument calibration was either not performed or not performed properly. Reject all associated data.
R^3	The ICS recovery for an element was less than 50% or severe interelement interferences were detected. Reject all associated data.
R^4	The matrix spike recovery for an element was less than 30%. Reject all associated data.
R^5	The recovery of an element in the aqueous LCS was less than 50%. Reject all associated data.
R^6	The analytical spike recovery for GFAA analysis was less than 10%. Reject the sample result.
R^7	The MSA did not meet criteria. Reject the sample result.
R^8	The ICP Serial Dilution did not meet criteria. Reject all associated data.

SAMPLE DATA SHEETS:

INORGANIC ANALYTES

META Environmental, Inc.
Sample Data Sheets: Inorganic Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:		2WTB8(1-3)			2WTB8(6-8)			2WTB8(10-12)			2WTB3(4-6)		
	IDL	Reported		Validated	Reported		Validated	Reported		Validated	Reported		Validated
Aluminum	60	17900	E	17900U3	13300	E	13300U3	26000	E	26000U3	16600	E	16600U3
Antimony	8	3.4	UW		3	U		2.7	UW		3	U	
Arsenic	2	6.8	N*	6.8U3, R4	5.2	N*	5.2U3, R4	2.2	N*	2.2U3, R4	10.3	N*S	10.3U3, R4
Barium	32	93.8			42.4	B		78.8			47.9	B	
Beryllium	1	1.8	B	1.8U3	1.7	B	1.7U3	1.9		1.9U3	1.8	B	1.8U3
Cadmium	5	6.7	N*	J5,6,7, 6.7U3	5.7	N*	J5,6,7, 5.7U3	3.3	N*	J5,6,7, 3.3U3	6.5	N*	J5,6,7, 6.5U3
Calcium	33	2360			6290			2130			4550		
Chromium	10	102			43.7			39.7			60.6		
Cobalt	20	9.2	B		10	B		6.7	U		10	B	
Copper	5	55			24.5			10.2			39.9		
Iron	20	27900			23100			8200			24600		
Lead	2	83.7		J7	22.4		J7	16		J7	15.3		J7
Magnesium	70	7840	E		7660	E		3400	E		8520	E	
Manganese	3	233			300			142			316		
Mercury	0.2	0.67	N	J5,7	0.18	UN	UJ5	0.17	UN	UJ5	1.1	N	J5,7
Nickel	15	26.9			23.5			13.7			28.6		
Potassium	830	4040			3410			2120			3850		
Selenium	2	0.93	BN	J5	0.75	UNW		0.72	BN	J5	0.74	UNW	
Silver	8	4.5			6.6			2.7	U		3	U	
Sodium	140	3150	E	J12, 3150U3	5250	E	J12	2380	E	J12, 2380U3	8920	E	J12
Thallium	3	1.6	UW		1.5	UW		1.4	UW		1.5	UW	
Vanadium	11	75		75U3	53.9		53.9U3	41.8		41.8U3	56.8		56.8U3
Zinc	7	62.9		62.9U3	71.5		71.5U3	44.8		44.8U3	95.9		95.9U3
Cyanide	10	2.7	U		2.3	U		2.2	U		2.3	U	
Dilution Factor:		1			1			1			1		
Matrix:		Soil			Soil			Soil			Soil		
Units:		mg/Kg			mg/Kg			mg/Kg			mg/Kg		

META

META Environmental, Inc.
Sample Data Sheets: Inorganic Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:		2WTB8(1-3)			2WTB8(6-8)			2WTB8(10-12)			2WTB3(4-6)		
	IDL	Reported		Validated	Reported		Validated	Reported		Validated	Reported		Validated
Aluminum	60	17900	E	17900U3	13300	E	13300U3	26000	E	26000U3	16600	E	16600U3
Antimony	8	3.4	UW		3	U		2.7	UW		3	U	
Arsenic	2	6.8	N*	6.8U3, R4	5.2	N*	5.2U3, R4	2.2	N*	2.2U3, R4	10.3	N*S	10.3U3, R4
Barium	32	93.8			42.4	B		78.8			47.9	B	
Beryllium	1	1.8	B	1.8U3	1.7	B	1.7U3	1.9		1.9U3	1.8	B	1.8U3
Cadmium	5	6.7	N*	J5,6,7, 6.7U3	5.7	N*	J5,6,7, 5.7U3	3.3	N*	J5,6,7, 3.3U3	6.5	N*	J5,6,7, 6.5U3
Calcium	33	2360			6290			2130			4550		
Chromium	10	102			43.7			39.7			60.6		
Cobalt	20	9.2	B		10	B		6.7	U		10	B	
Copper	5	55			24.5			10.2			39.9		
Iron	20	27900			23100			8200			24600		
Lead	2	83.7		J7	22.4		J7	16		J7	15.3		J7
Magnesium	70	7840	E		7660	E		3400	E		8520	E	
Manganese	3	233			300			142			316		
Mercury	0.2	0.67	N	J5,7	0.18	UN	UJ5	0.17	UN	UJ5	1.1	N	J5,7
Nickel	15	26.9			23.5			13.7			28.6		
Potassium	830	4040			3410			2120			3850		
Selenium	2	0.93	BN	J5	0.75	UNW		0.72	BN	J5	0.74	UNW	
Silver	8	4.5			6.6			2.7	U		3	U	
Sodium	140	3150	E	J12, 3150U3	5250	E	J12	2380	E	J12, 2380U3	8920	E	J12
Thallium	3	1.6	UW		1.5	UW		1.4	UW		1.5	UW	
Vanadium	11	75		75U3	53.9		53.9U3	41.8		41.8U3	56.8		56.8U3
Zinc	7	62.9		62.9U3	71.5		71.5U3	44.8		44.8U3	95.9		95.9U3
Cyanide	10	2.7	U		2.3	U		2.2	U		2.3	U	
Dilution Factor:		1			1			1			1		
Matrix:		Soil			Soil			Soil			Soil		
Units:		mg/Kg			mg/Kg			mg/Kg			mg/Kg		

META

META Environmental, Inc.
Sample Data Sheets: Inorganic Analysis

Reference: NVDV930503A
Site: Naval Submarine Base, Groton, CT
COC No.: N008, N011

Sample ID:		2DMW11S(2-4)			3MW12S(0-3)								
	IDL	Reported		Validated	Reported		Validated	Reported		Validated	Reported		Validated
Aluminum	60	17000			14000								
Antimony	8	2.3	UNW		2.6	UNW							
Arsenic	2	2.2	B	J5, R4	2.6	B	J5, R4						
Barium	32	31.4	B		70.6								
Beryllium	1	0.75	B		0.52	B							
Cadmium	5	5		J5,6,7, 5.0U3,4	5.1		J5,6,7, 5.1U3,4						
Calcium	33	865	B		2590								
Chromium	10	21.9			27.9								
Cobalt	20	6.1	B		6.5	U							
Copper	5	12.2		12.2U3	11.8								
Iron	20	16100			12000								
Lead	2	15.1	N	J7	17.8	NS	J7						
Magnesium	70	2880			3510								
Manganese	3	94.6	N*		255	N*							
Mercury	0.2	0.13	U	UJ5	0.16	UN	UJ5						
Nickel	15	14.3		14.3U3	16.4		16.4U3						
Potassium	830	323	B	323U3	884	B	884U3						
Selenium	2	0.58	U		0.65	U							
Silver	8	2.3	U		2.6	U							
Sodium	140	318	B	J12, 318U3	630	B	J12, 630U3						
Thallium	3	1.2	U		1.3	U							
Vanadium	11	31.5			31.3								
Zinc	7	82.1			83.8								
Cyanide	10	1.8	U		2	U							

Dilution Factor:	1	1
Matrix:	Soil	Soil
Units:	mg/Kg	mg/Kg

META